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English Translation

DISC BRAKE WITH AN ADJUSTMENT DEVICE, IN PARTICULAR FOR A  
COMMERCIAL VEHICLE

The present invention relates to a disc brake, particularly for a commercial vehicle, according to the preamble of Claim 1.

In the case of such a disc brake, which is known, for example, from German Patent Document DE 94 22 342 U1 and which is normally pneumatically operable, the brake application device is coupled with a traverse beam in which preferably two adjusting screws are disposed which each have a pressure piece for receiving a brake shoe pressed against a brake disc in the event of an operation.

The two adjusting screws are equipped with an external thread and are screwed into a respective assigned threaded bore of the traverse beam.

By means of an adjusting device which is assigned to an adjusting screw and a driving dog of the other adjusting screw, in the event of a wear of the brake pad, the brake shoe is applied to such as extent by rotating the adjusting screws in the

threaded bores that a release play between the brake pad and the brake disc essentially always remains constant.

In order to prevent that, as a result of shocks during the travelling operation, the adjusting screws change their position and thus the distance between the brake pad and the disc brake, thus the release play, protection elements are used which have a rotation-inhibiting effect on the adjusting screws, so that the above-mentioned unintended adjusting of the adjusting screws is prevented. In this case, the protection devices rest frictionally against the adjusting screw or against parts thereof.

The frictional force is proportioned such that, at a certain torque to be applied by the adjusting device, the adjusting screws can be rotated without any problem, in which case this torque is greater than a torque that may result from the shock forces in the travelling operation.1

A known protection device consists of a secondary seal which is arranged in the end area of an adjusting screw facing the pressure piece and engages in a protective manner in the adjusting screw.

Among other things, for the function of the rotational inhibition, the secondary seal or the part engaging in the adjusting screw consists of a plastic material which may be detrimentally affected mainly by the friction heat occurring during the braking.

In the same manner, this applies to a sleeve also consisting of a plastic material by means of which a pressure spring can be prestressed and which, on the other side, is supported on the above-mentioned driving dog of the second adjusting screw, whereby a rotational inhibition is achieved in this area.

As a result of the construction-caused different interventions in the sense of a rotational inhibition of the two protection elements, in addition, an adjustment of the coefficient of friction which is the same for both protection elements is virtually impossible, which can also lead to problems during the adjusting as well as for the protection of the two adjusting screws.

It is therefore an object of the present invention to further develop a disc brake of the above-mentioned type such that, by means of constructively simple devices, the reliability of the rotational inhibition of the adjusting screw is improved

and the operating reliability as a whole is increased.

This object is achieved by means of a disc brake having the characteristics of Claim 1.

Inside the threaded bore or the engaging area of the threaded screw in the thread of the threaded bore, the arrangement of the protection element in the form of a spring ring is essentially freely selectable, so that the spring ring can be placed outside an area acted upon by the heat occurring during a braking. As a result, material-damaging influences can virtually no longer occur or can occur only to an insignificant degree, whereby a protection is obtained which is considerably improved in comparison to the prior art.

The spring ring advantageously consists of metal instead of plastic, as previously. Because of the insensitivity of the metal with respect to heat in contrast to the previously used plastic material, the protection element can virtually be provided at any suitable point of the operating area without resulting in service life disadvantages. Furthermore, the wear of the protection element caused by the frictional forces having the rotation-inhibiting effect is also negligibly low so that, on the whole, a significant improvement of the operating reliability is

obtained in the continuous operation.

Since a precise positioning of the protection elements now becomes possible as well as exactly the same construction, particularly with respect to the material and the shape of the spring rings, an equally large clamping torque becomes operative for both adjusting screws.

The clamping effect itself can be defined, specifically by the type and construction of the spring rings as well as the defined mounting position between the components to be braced.

The rotational inhibition of the threaded screws takes place uniformly over the entire circumference without an attack on the thread flanks, whereby a gentle clamping is obtained.

The required clamping force of the spring ring can be achieved by geometrical changes but also by the corresponding selection of the material and can be exactly predefined.

According to another idea of the invention, it is provided that the spring ring is designed with an undulated contour, so that one portion of the forming, radially aligned summits rests against the bottom of the ring groove and the other portion rests

against the thread of the assigned component, thus of the adjusting screw or of the threaded bore.

Since the spring ring is in a frictional contact over the entire circumference, an antitwist protection for the spring ring is not necessary.

In addition, the manufacturing of the spring ring, its mounting as well as the placing of the spring groove can take place in a very simple and cost-effective manner. An exchange of the spring ring is also very easy so that, on the whole, an optimization can take place with respect to costs, which is particularly advantageous in view of the fact that such disc brakes are used in large piece numbers.

Additional advantageous further developments of the invention are characterized in the subclaims.

Embodiments of the invention will be described in the following by means of the attached drawings.

Figure 1 is a partially sectional top view of a disc brake according to the invention;

Figure 2 is a perspective view of a detail of the disc brake;

Figure 3 also is a perspective view of a protection element according to the invention.

Figure 1 illustrates a disc brake, particularly for a commercial vehicle, which has a caliper 2 in its basic construction, which caliper 2 comprises a ventilated brake disc 1 which is fastened to an axle of the commercial vehicle which is not shown.

Relative to the brake disc 1, the caliper 2 is axially displaceably fastened to a brake anchor plate 6 of the commercial vehicle.

For this purpose, fastening elements 5 are provided which each have a guide bush 7 as well as a guiding strut 8.

The guide bushes 7 are immovably connected with the caliper 2, while the guiding struts 8 are screwed into the brake anchor plate 6 so that the guide bushes 7 together with the caliper 2 are axially displaceably disposed on the guiding struts 8 which to this extent are stationary.

As also illustrated in Figure 1, the brake disc 1 can be brought into an operative connection with brake pads 9 for the purpose of braking. For this purpose, the brake pads 9 are pressed against the brake disc 1 during the braking.

For triggering a braking operation, a brake application device 11 is arranged on one side of the caliper 2. The present embodiment shows only a part of this brake application device 11 which is connected to a traverse beam 10.

Two parallel adjusting screws 12 which extend at a distance from one another, have an external thread and carry one pressure piece 13 respectively at one end, one of the two brake pads 9 being fastened thereto, are screwed into the traverse beam 10.

By means of an adjusting device, which is not shown and which is coupled with at least one of the two adjusting screws 12, it is achieved during each operation of the brake application device 11 that the release play changing because of a brake pad wear remains constant; that is, the adjusting screws 12 are correspondingly axially displaced by rotation.

In this case, the rotation of one adjusting screw 12 caused

by the adjusting device can be transmitted by a synchronization device to another adjusting screw, so that the latter is rotated by the same angular amount with the result that both adjusting screws 12 are moved by exactly the same axial distance.

In order to prevent that, in the travelling operation, for example, as a result of shocks, the adjusting screws 12 rotate in an unintended manner and the release play is thereby changed in a correspondingly unintended manner, protection devices are in each case provided in the form of a spring ring 14 which rests in a rotation-inhibiting manner either against the thread of the adjusting screw 12 or the threaded bore 16.

Both embodiments are illustrated in Figure 1. In this case, it is shown that the upper adjusting screw 12 has a surrounding ring groove 15 in which the spring ring 14 is disposed. In contrast, the ring groove 15 is formed in the area of the lower adjusting screw 12 by means of a recess in the threaded bore 16 in which the spring ring 14 is disposed and rests frictionally on the external thread of the adjusting screw 12.

Figure 2 shows an enlarged representation as a schematic cutout of the traverse beam 10, this representation corresponds to the area of the lower adjusting screw 12 according to Figure

1.

As in Figure 3, it is illustrated here that the spring ring 14 has an undulated contour whose summits 17 alternately rest on the bottom of the spring groove 15 and on the external thread of the adjusting screw 12.

As further illustrated in Figure 3, the spring ring 14, which is preferably shaped from a strip of steel plate, is slotted, so that spring forces can be radially effective.

In addition to the illustrated shape of the spring ring 14, other shapes, particularly other contours, are naturally conceivable.

The ring groove 15, which preferably extends without a slope, is adapted in its width to the width of the spring ring 14, so that the latter rests in it in an axial-displacement-proof manner.

List of Reference Numbers

1	Brake disc
2	caliper
3	
4	
5	fastening element
6	brake anchor plate
7	guide bush
8	guiding strut
9	brake pad
10	traverse beam
11	application device
12	adjusting screw
13	pressure piece
14	protection element
15	ring groove
16	threaded bore
17	mound